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Leather — Physical and mechanical tests — Determination of dimensional change

Cuir — Essais physiques et mécaniques — Détermination des variations dimensionnelles

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by the Physical Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUP Commission, IULTCS) in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 289, *Leather*, the secretariat of which is held by UNI, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

IULTCS, originally formed in 1897, is a worldwide organization of professional leather societies to further the advancement of leather science and technology. IULTCS has three Commissions, which are responsible for establishing international methods for the sampling and testing of leather. ISO recognizes IULTCS as an international standardizing body for the preparation of test methods for leather.

This second edition cancels and replaces the first edition (ISO 17130:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— a new Clause 3 has been added;

— 5.4 and 5.6 have been revised to allow an additional support and an additional marking technique, respectively;

— 6.1 and 6.2 have been revised to give a better understanding;

— 7.2, 7.3, 7.4 and 7.5 have been revised; in 7.5 the conditioning time has been reduced to 24 h;

— a new Clause 9 c) requires the sample size to be reported.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Leather — Physical and mechanical tests — Determination of dimensional change

1 Scope

This document specifies a method of determining the dimensional change (shrinkage) of leathers caused by ageing. It is applicable to all leathers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 105-B06, *Textiles — Tests for colour fastness — Part B06: Colour fastness and ageing to artificial light at high temperatures: Xenon arc fading lamp test*

ISO 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

ISO 2419, *Leather — Physical and mechanical tests — Sample preparation and conditioning*

ISO 17228:2015, *Leather — Tests for colour fastness — Change in colour with accelerated ageing*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

A conditioned test piece is aged using the conditions defined in ISO 17228. The shrinkage is determined after reconditioning.

5 Apparatus and materials

5.1 Oven, as specified in ISO 17228.

5.2 Climate chamber, as specified in ISO 17228.

5.3 Vernier calliper, reading to 0,1 mm.

5.4 Support, glass plate or suitable stainless-steel mesh, that keeps the test piece flat. Support shall be covered with a polyester nonwoven fabric, as specified in ISO 105-B06, to prevent the test piece from sticking.

5.5 Press knife, square, as specified in ISO 2419, with inner walls measuring 150 mm ± 1 mm.

5.6 Indelible marker or needle with a diameter less than or equal to 1 mm.

6 Sampling and sample preparation

6.1 Sample in accordance with ISO 2418. Cut at least two test pieces (150 × 150) mm for each of the ageing conditions required, by applying the press knife (5.5) to the grain surface, if distinguishable.

For some applications, it can be necessary to use larger test pieces, for example (300 × 300) mm to enhance the accuracy, especially in the case of low shrinkage.

6.2 Using an indelible marker or needle (5.6), mark four measurement reference points, A, B, C and D, on the test pieces such that they form a square having sides of (100 ± 1) mm as shown in Figure 1.

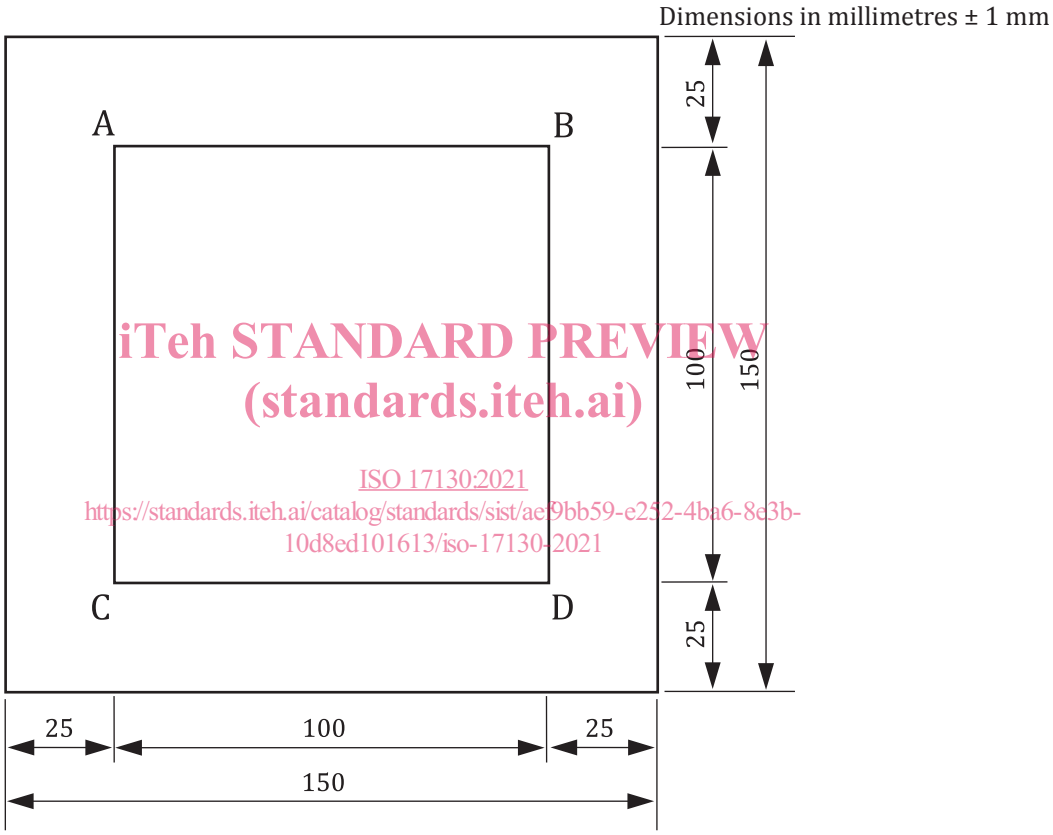

Figure 1 — Location of measurement reference points on a test piece

If test pieces with another dimension, for example (300 × 300) mm, are used, the measurement points should be marked at a distance of (25 ± 1) mm from each edge.

6.3 Condition the test pieces in accordance with ISO 2419 for at least 48 h.

7 Procedure

7.1 Measure the distances AB, CD, AC and BD on each test piece using the Vernier calliper (5.3).

7.2 Preheat the oven (5.1) to the test temperature or adjust the climate chamber (5.2) to the starting conditions. Place the test pieces with the grain side, top side or coated side downward on the support (5.4) in the centre of the oven or climate chamber.

7.3 Age the test pieces as described in ISO 17228:2015, Table 1, Table 2 or Table 3, by heat, by heat and elevated humidity, or under cyclic temperature or humidity conditions, respectively.

7.4 If required, immediately after ageing, at the end of a period of cyclic ageing or intermediately between periods of cyclic ageing, and within 5 min of removal of the test piece from the oven (5.1) or climate chamber (5.2), the distances between the measurement points may be measured according to 7.1. If further cyclic ageing is required, the test piece shall be returned to the climate chamber as quickly as possible.

7.5 When the ageing procedure is complete, remove the test piece from the climate chamber and from the glass plate or stainless-steel mesh and place on a flat and horizontal plane prior to reconditioning the test pieces for at least 24 h in accordance with ISO 2419. After this, measure the distances between the measurement points according to 7.1.

NOTE The measurement values taken immediately after ageing can significantly differ from those taken after reconditioning in accordance with ISO 2419.

7.6 Note any visual changes of the test piece, such as distortion, and any changes in flexibility and softness manually.

8 Expression of results

8.1 The shrinkage may be expressed as linear shrinkage or loss of area (area shrinkage).

8.2 The linear shrinkage is calculated using Formulae (1), (2) and (3).

Calculate the mean of original length, L_1, bounded by the points ABCD on the test piece, according to Formula (1):

$$L_1 = \frac{(a_1 + c_1 + b_1 + d_1)}{4} \tag{1}$$

where a_1, b_1, c_1, and d_1 are the values of the dimensions AB, BD, CD and AC, respectively (see Figure 1), measured before the test.

Calculate the mean of length after the test, L_2, bounded by the points ABCD on the test piece, according to Formula (2):

$$L_2 = \frac{(a_2 + c_2 + b_2 + d_2)}{4} \tag{2}$$

where a_2, b_2, c_2 and d_2 are the values of the dimensions AB, BD, CD and AC, respectively (see Figure 1), measured after the test.

Calculate the percentage linear shrinkage, S_L, using Formula (3):

$$S_L = \frac{L_1 - L_2}{L_1} \times 100 \tag{3}$$

where

L_1 is the mean of original length, calculated from Formula (1);

L_2 is the mean of length after the test, calculated from Formula (2).

8.3 For calculation of loss of area (area shrinkage), S_A, proceed as follows:

Calculate the original area, A_1, bounded by the points ABCD on the test piece, using Formula (4):

$$A_1 = \frac{a_1 + c_1}{2} \times \frac{b_1 + d_1}{2} \tag{4}$$

where a_1, b_1, c_1 and d_1 are the values of the dimensions AB, BD, CD, AC (see Figure 1), measured before the test.

Calculate the area after the test, A_2, bounded by the points ABCD on the test piece, using Formula (5):

$$A_2 = \frac{a_2 + c_2}{2} \times \frac{b_2 + d_2}{2} \tag{5}$$

where a_2, b_2, c_2 and d_2 are the values of the dimensions AB, BD, CD, AC (see Figure 1), measured after the test.

Calculate the percentage loss of area (area shrinkage) S_A, using Formula (6):

$$S_A = \frac{A_1 - A_2}{A_1} \times 100 \tag{6}$$

where

A_1 is the original area, calculated from Formula (4);

A_2 is the area after the test, calculated from Formula (5).

9 Test report

The test report shall include the following:

a) a reference to this document, i.e. ISO 17130:2021;

b) full details for identification of the sample and any deviation from ISO 2418 with respect to sampling;

c) the dimensions of the test pieces used;

d) description of the support used (glass or stainless-steel mesh with or without polyester nonwoven fabric);

e) the test conditions used for ageing;

f) the timing of measurement if less than the 24 h reconditioning in 7.5;

g) mean value of the percentage linear shrinkage, S_L, as calculated in 8.2 or mean value of percentage loss in area, S_A (area shrinkage), as calculated in 8.3 to the nearest 0,1 %;

h) details of any visual changes or changes in flexibility and softness;

i) the standard atmosphere used for conditioning and testing as given in ISO 2419;

j) any deviations from the method specified in this document;

k) the date of the test.

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